

# Informational Leaflet 44

KING CRAB, Paralithodes camtschatica (Tilesius)

TRAWL SURVEY OF LONG ISLAND BANK,

EAST OF KODIAK ISLAND, ALASKA

JUNE 1963

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August 1964

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## INTRODUCTION

Long Island Bank is an offshore plateau ranging in depth from 20 to 50 fathoms surrounded by a deep trench 60 to 120 fathoms. Area of the bank is approximately 800 square miles and its shoreward edge lies 15 miles east of the city of Kodiak, Alaska and extends 45 miles seaward. This survey was conducted to determine if ocean breeding occurs and if offshore shallows, such as Long Island Bank, serve as juvenile rearing areas.

Life history studies reveal that king crabs move into the shallow areas of bays from December through March with males preceding females. During April and May adult females molt and breeding occurs. It is not known if crabs simultaneously migrate onto shallow ocean banks far from shore to molt and breed.

During a four day period 21 stations were sampled, eight inshore areas near Kodiak and 13 offshore areas on Long Island Bank. Trawl data were compared between these two adjacent areas.

From June 10 to June 14, 1963, the 82-foot crab fishing boat OCEANIC was chartered for trawling. The charter had originally been planned for late April or early May so that crabs preparing to breed could be captured as well as young juveniles. Prior to breeding adult males "clasp" female partners and the presence of breeding pairs would have suggested a breeding area. A major breakdown in the vessel delayed the survey and, as a result, breeding activity was over before the survey got underway. In spite of this delay, data was still obtained allowing king crab from an ocean location to be compared to an inshore area.

## METHODS

Inshore trawl stations were selected, rather than sampled randomly in order to ascertain trawl capabilities in prescribed areas and to establish an index of the depth distribution of post-larval crabs which were known to exist in Chiniak Bay (Figure 1). Long Island Bank was divided and each division sampled randomly. One of the 13 trawls (trawl 19) was actually divided beyond the bank in deeper water (Figure 2).

Two standard otter trawls were used, one with a 90-foot ground line and the other with a 60-foot ground line. The cod ends of both trawls were lined with 1/2 inch Manryo netting.

Most of the king crabs caught were measured and examined for exoskeletal hardness in an attempt to define time since ecdysis. Females were inspected for the presence of eggs. Egg color was recorded to determine if a correlation with exoskeletal hardness existed. Stomach analysis was performed on numerous fish large enough to consume post-larval king crabs.

Adult crabs referred to in this paper are those over 95 mm in carapace length. Adulthood has been previously determined by analysis of the gravid condition of thousands of females (Powell and Nickerson, 1964). Males probably attain sexual maturity at the same size and age as females.

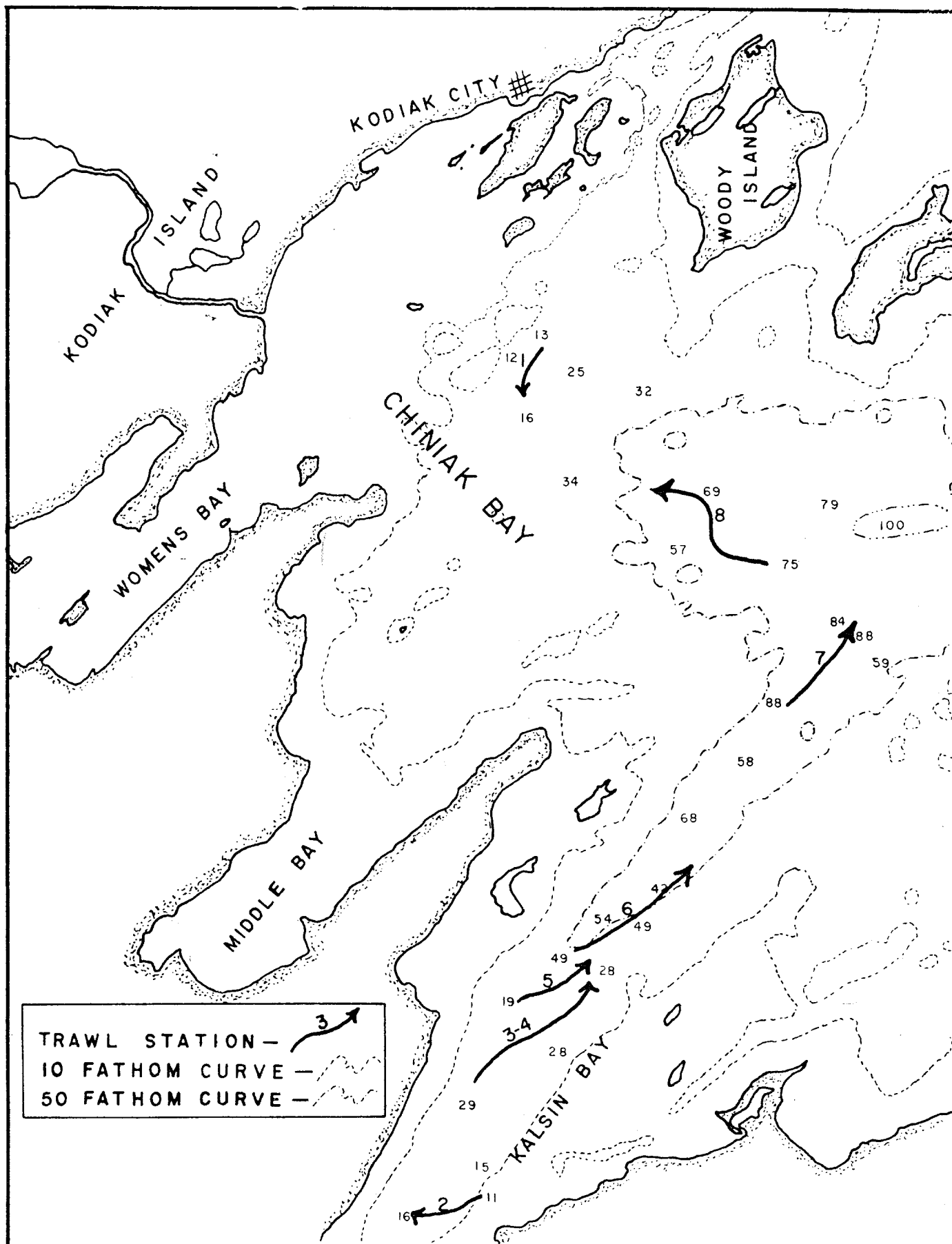


Figure 1. Inshore sample stations 1 through 8 in Chiniak and Kalsin Bays, just south of Kodiak City, Alaska.

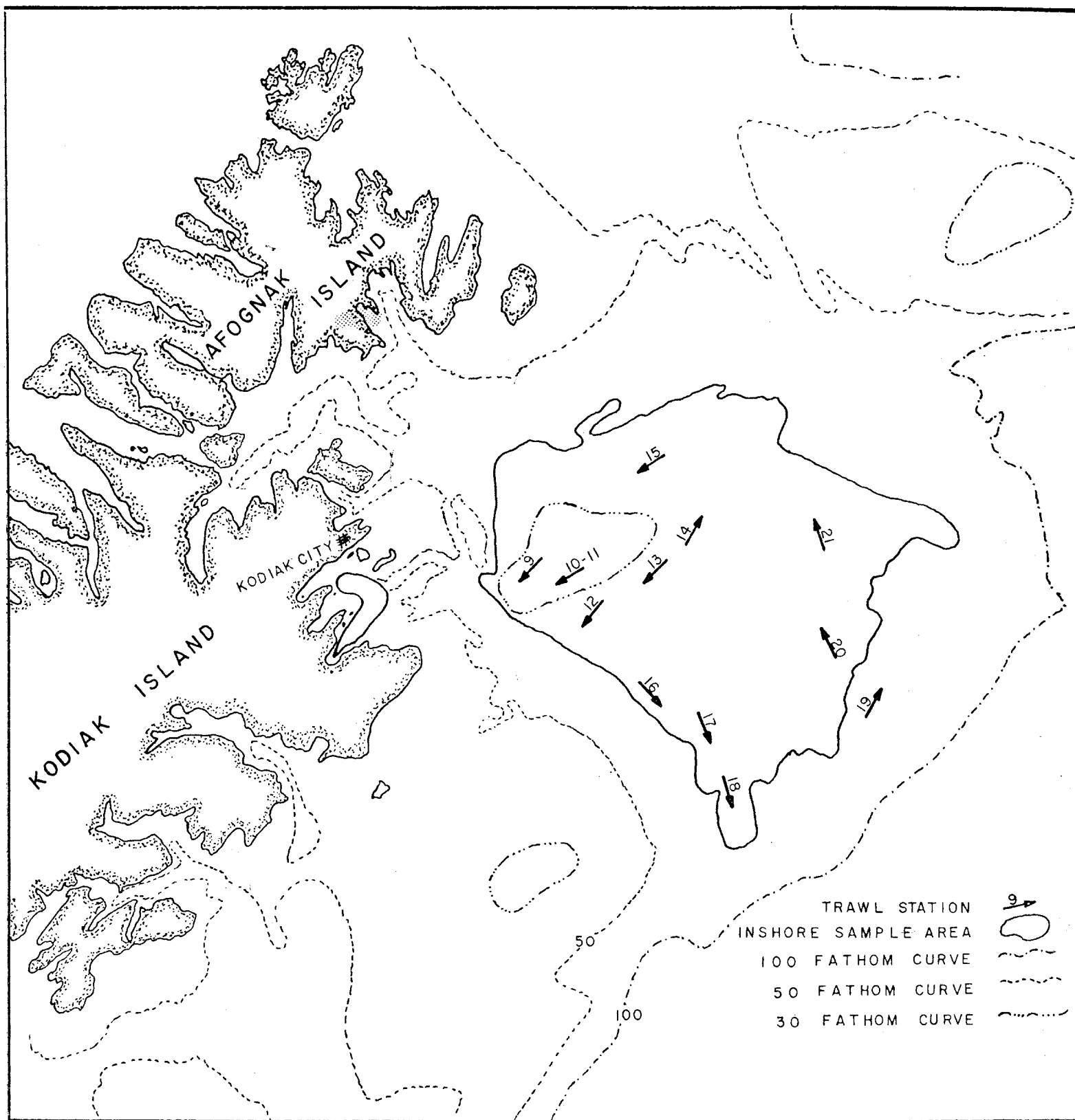


Figure 2. Long Island Bank, 15 miles east of Kodiak, Alaska, showing offshore sample stations 9 through 21, and their geographical relationship to the inshore sampling area.

## PRESENTATION OF DATA

Inshore dragging stations are identified in Figure 1 and those offshore in Figure 2. Individual catch data are listed in Tables 1 and 2.

Depths of stations ranged from 11 to 88 fathoms and were sampled using the 90 foot trawl. Average towing duration was 26 minutes. Depth of stations offshore ranged from 26 to 48 fathoms using both 90 and 60 foot trawls and averaged 22 minutes towing time. At station 10 (second tow offshore) the 90 foot trawl was torn beyond repair and replaced with the 60 foot trawl.

### Inshore Dragging Results

Post-larval crabs, juveniles, and adults of both sexes were present inshore. The large trawls captured some post-larval crabs but are not believed adequate for obtaining quantitative data.

Twenty-nine post-larval crabs were caught at depths of 11 to 58 fathoms at stations 2, 3, 5, and 6 (Table 1) and ranged from 9 to 15 millimeters in length (approximately 13 months old). Two additional post-larval crabs were found in the stomach of a sculpin caught at station 4. No larval crabs were found at stations 1 and 7. Concentrations of post-larval crabs have been found in depths of 29 fathoms in the Bering Sea (INPFC, 1959).

The 8 inshore tows produced a combined total of 93 juveniles and 87 adults (28 males and 59 females). All females over 110 millimeters were ovigerous.

In addition to king crabs, other animals captured include 730 sculpins, 1,498 Tanner crabs, 61 Dungeness crabs, and 3,433 flounders. A total of 176 sculpins were gutted and found to contain primarily shrimp, fish, and Tanner crabs.

### Dragging Results on Long Island Bank

Post-larval king crabs were not found at any of the 13 offshore sample stations (Table 2). The combined offshore dragging produced 18 juvenile king crabs and 514 adults (58 males and 456 females). All but three females over 110 mm in carapace length were ovigerous.

Of 316 ovigerous females, 158 had all brown eggs, the other 158 carried all purple eggs. Both soft and hard-shell females bore eggs of each color indicating no relationship with time since ecdysis.

Other animals which were abundant include 459 Tanner crabs, 117 halibut, 1,894 flounders, and 637 sculpins. Analysis of 80 sculpin stomachs indicated a wide variety of diet, but showed a predominance of young Tanner crabs and other non-commercial crab species. In general, the offshore dragging produced a greater variety of fish and invertebrate life than was found inshore.

Table 1. Comparison of the number of juvenile and adult king crabs between inshore and offshore sampling stations, including trawl statistics, June 1963.

Sample station <sup>1</sup>	Number of king crabs				Totals	Trawl statistics			
	post-larval (9-15 mm)	juvenile (16-35 mm)	adult females (over 95 mm)	adult males (over 95 mm)		duration (minutes)	distance (miles)	depth (fathoms)	
								minimum	maximum
June 10, 1963									
	Inshore								
1	0	38	19	7	114	16	1/2	15	17
2	7	4	10	5	26	20	1/2	11	16
3	6	0	3	1	10	40	1-1/2	30	36
4 <sup>2</sup>	0 <sup>3</sup>	1	3	6	10	30	1	29	28
5 <sup>2</sup>	5	0	0	0	5	25	3/4	42	48
6	11	0	5	4	20	30	1	50	58
7	0	0	19	5	24	30	1	83	88
Totals	29	93	59	28	209	191	6		
June 11, 1963									
	Offshore								
9	0	1	370 <sup>4</sup>	26	397	20	1/2	26	28
11	0	0	14	12	26	10	1/4	26	29
12	0	0	31	8	39	20	2/3	30	32
13	0	15	19	4	38	22	2/3	34	37
14	0	1	0	1	2	25	2/3	42	45
15	0	0	0	0	0	20	2/3	33	39
June 13, 1963									
16	0	0	21	3	24	30	1	42	48
17	0	0	1	3	4	30	1	42	46
20	0	1	0	1	2	25	1	40	45
21	0	0	0	0	0	30	1	39	40
Totals	0	18	456	58	532	232	7		

<sup>1</sup> Stations 8,10,18, and 19 are omitted because the trawl was damaged severely and no crabs caught.

<sup>2</sup> Pucker string was open and the only crabs captured were those entangled in the web.

<sup>3</sup> Two post-larval king crabs were found in the stomach of a sculpin captured in this drag.

<sup>4</sup> Included are 126 females which were not measured but were recorded as ovigerous.

Table 2. Comparison of length frequency distributions between king crabs from inshore and offshore sample stations, June 10-13, 1963.

Size Group (mm)	Station <sup>1</sup>																		
	Inshore								Offshore										
	1	2	3	4 <sup>2</sup>	5 <sup>2</sup>	6	7	Total	9	11	12	13	14	15	16	17	20	21	Total
9	-	1	3	-	3	1	-	8	-	-	-	-	-	-	-	-	-	-	0
10- 19	-	6	3	-	2	10	-	21	-	-	-	-	-	-	-	-	-	-	0
20- 29	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	1	-	1
30- 39	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0
40- 49	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	0
50- 59	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	0
60- 69	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	0
70- 79	30	1	-	-	-	-	-	31	-	-	-	2	-	-	-	-	-	-	2
80- 89	52	3	1	1	-	-	-	57	-	-	-	9	-	-	-	-	-	-	9
90- 99	10	5	-	2	-	-	-	17	1	-	-	8	1	-	-	-	-	-	10
100-109	8	4	3	3	-	2	1	21	9	3	4	5	-	-	-	-	-	-	21
110-119	4	1	-	-	-	2	-	7	53	12	5	4	-	-	1	-	-	-	75
120-129	2	-	-	1	-	1	12	16	98	6	15	4	1	-	2	-	-	-	126
130-139	3	3	-	-	-	1	5	12	72	5	10	3	-	-	7	1	-	-	98
140-149	1	1	-	1	-	2	5	10	22	-	3	1	-	-	6	-	1	-	33
150-159	1	-	-	1	-	-	-	2	10	-	2	2	-	-	2	-	-	-	16
160-169	1	1	-	1	-	-	-	3	6	-	-	-	-	-	3	-	-	-	9
170-179	-	-	-	-	-	1	-	1	-	-	-	-	-	-	2	1	-	-	3
180-189	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	2	-	-	3
Totals	114	26	10	10	5	20	24	209	271 <sup>3</sup>	26	39	38	2	0	24	4	2	0	406

<sup>1</sup> Data from stations 8, 10, 18, and 19 is omitted because the trawls were severely torn.

<sup>2</sup> Pucker string on cod end came loose before trawl was brought aboard the boat.

<sup>3</sup> Of the 397 crabs captured in drag 9 only 271 were measured.

## DISCUSSION

Much of the continental shelf around Kodiak Island is difficult to sample by trawling because of rock and shell bottom. For this reason before these areas can be surveyed effectively a more useful gear must be developed. Commercial crab pots can be adapted to catch juveniles by replacing standard size mesh with a smaller weave, but the technique relies upon attraction by bait which does not lure post-larval crabs or mating crabs.

The limited dragging indicated that planktonic crab larvae settle to the bottom in greater numbers in inshore areas. Studies by the halibut commission (Thompson and Van Cleve, 1936) conducted in the Gulf of Alaska have shown that natural surface currents carry planktonic halibut larvae towards shore. The presence of post-larval crabs inshore and not offshore suggested that either planktonic crab larvae were also carried shoreward, or that they are hatched inshore, or a combination of both. Most post-larval and juvenile crabs were found in the bays implying that inshore areas supported more sub-adults than offshore shallows, and also served as rearing areas.

The abundance of adult females offshore at this time of year indicated that either ocean spawning is common or that females migrate seaward soon after their bay spawning is completed.

Since no correlation was apparent between female exoskeleton condition and egg color, it was concluded that egg color is not indicative of time since ecdysis or fertilization.

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